IN THE CLAIMS

Listing of Claims:

1. (currently amended) A method for substantially increasing production rates of nanopowder in a nanopowder synthesis system, which comprises the steps of:

immersing at least one member of precursor material in a gaseous atmosphere;

applying a high magnetic field to said precursor material in an area of plasma interaction with said at least one member of precursor material; and

forming a plasma that interacts with said at least one member of precursor material and said gaseous atmosphere to produce said nanopowder.

2. (original) A method for substantially increasing production rates of nanopowder in a nanopowder synthesis system, which comprises the steps of:

immersing into a gaseous atmosphere a pair of ablative electrodes of precursor material which are in substantial axial alignment but spaced apart in opposing relation;

applying a high magnetic field to said pair of ablative electrodes which is in near proximity to area of plasma interaction with said pair of ablative electrodes; and

forming a high power pulsed electrical discharge arc between said pair of ablative electrodes to generate a plasma that interacts with said gaseous atmosphere to produce said nanopowder.

3. (original) The method of Claim 2, wherein the step of forming said high power pulsed electrical discharge arc occurs a time delay after the step of applying said high magnetic field, and said time delay is such as to ensure that said high magnetic field is present when said high power pulsed electrical discharge arc is formed.

4. (original) The method of Claim 2, wherein the step of applying said high magnetic field is initiated at a same time as the step of forming said high power pulsed electrical discharge arc.

5. (original) The method of Claim 2, wherein said high magnetic field and said plasma are pulsed.

6. (original) The method of Claim 2, wherein said gaseous atmosphere is comprised of at least one of a quenching gas and a reaction gas.

7. (currently amended) A system for synthesizing nanopowder in increased yields, which comprises:

at least one member of precursor material immersed in a gaseous atmosphere;

means for applying a high magnetic field to said at least one member of precursor material in near proximity of area of interaction of said at least one member of precursor material with a plasma; and

power means, in electrical connection with said at least one member of precursor material and said means for applying a high magnetic field, for creating said plasma in the presence of said high magnetic field to thereby produce said nanopowder.

8. (currently amended) A method for substantially increasing production rates of a nanopowder while reducing nanoparticle agglomeration in a nanopowder synthesis system, which comprises the steps of:

immersing at least one member of nanopowder precursor material in a gaseous atmosphere;

supplying a coating precursor material, for coating said nanopowder, into said gaseous atmosphere;

applying a high magnetic field to said at least one member of nanopowder precursor material in an area of plasma interaction with said at least one member of nanopowder precursor material; and

applying a high power pulsed electrical discharge arc to said at least one member of nanopowder precursor material to generate a plasma that interacts with said gaseous atmosphere to produce said nanopowder.

9. (currently amended) A system for synthesizing nanopowder in increased yields with reduced nanoparticle agglomeration, which comprises:

at least one member of a nanopowder precursor material immersed in a gaseous atmosphere;

means for applying a high magnetic field to said at least one member of said nanopowder precursor material in near proximity of an area of interaction of said at least one member of said nanopowder precursor material with a plasma;

power means, in electrical connection with said at least one member of said nanopowder precursor material and said means for applying a high magnetic field, for creating said plasma in the presence of said high magnetic field to produce said nanopowder; and

means for applying a coating precursor material to said nanopowder to reduce nanoparticle agglomeration.

10. (original) A system for synthesizing nanopowder in increased yields, which comprises:

a pair of electrodes of precursor material axially aligned but spaced apart in opposing relation;

a solenoid magnet for generating a high magnetic field which surrounds opposing tips of said pair of electrodes and overlapping a space gap between said pair of electrodes, with a principal axis of said solenoid magnet in axial alignment with said pair of electrodes;

means for immersing said pair of electrodes in a gaseous atmosphere; and

power means in electrical connection with said solenoid magnet and said pair of electrodes for energizing said solenoid magnet to generate a high magnetic field, and forming a high power pulsed electrical discharge arc between said pair of electrodes in the presence of said high magnetic field to create a plasma for producing said nanopowder.

11. (original) The system for synthesizing nanopowder of Claim 10 above, wherein said solenoid magnet is energized first, and after a time delay occurs said high power pulsed electrical discharge arc is formed between said pair of electrodes.

12. (original) The system for synthesizing nanopowder of Claim 10 above, wherein said solenoid magnet is energized at a same time as said high power pulsed electrical discharge arc is formed between said pair of electrodes.

13. (original) The system for synthesizing nanopowder of Claim 10 above, wherein a one of a permanent magnet and a superconducting magnet is used instead of said solenoid magnet.

14. (original) The system for synthesizing nanopowder of Claim 10 above, wherein said solenoid magnet is replaced by dual magnets electrically connected in series, wherein principal axis of said dual magnets are in axial alignment with said pair of electrodes, and wherein said dual magnets are spaced apart with a first of said dual magnets surrounding a first of said pair of electrodes at a distance from said space gap, and a second of said dual magnets surrounding a second of said pair of electrodes at a distance from said space gap.

15. (original) The system for synthesizing nanopowder of Claim 14 above, wherein each of said dual magnets includes a replaceable shield facing said space gap.

16. (original) The system for synthesizing nanopowder of Claim 10 above, wherein said solenoid magnet includes a central insert for protecting structural integrity of said solenoid magnet and controlling direction of expansion of said plasma.

17. (original) The system for synthesizing nanopowder of Claim 16 above, wherein said central insert is ablative, and is composed of one of polycarbonate, and polyethylene.

18. (currently amended) A system for synthesizing nanopowder in increased yields with reduced nanoparticle agglomeration, which comprises:

at least one member of precursor material for ablation in producing a plasma;

a solenoid magnet having a principal axis which is axially aligned with said at least one member <u>of precursor material</u> for applying a high magnetic field in near proximity to interaction of said at least one member <u>of precursor material</u> with said plasma;

means for immersing said at least one member <u>of precursor material</u> in a gaseous atmosphere of one of a reaction gas, a quenching gas, and a combination of said reaction gas and said quenching gas; and

power means<u>,</u> in electrical connection with said solenoid magnet and said at least one member <u>of precursor material,</u> for generating said high magnetic field and said plasma.

19. (original) A system for synthesizing nanopowders, which comprises:

a reaction chamber having a gaseous atmosphere;

a pair of ablative electrodes in axial alignment but spaced apart in opposing relation, with said pair of ablative electrodes being indexable toward each other and in pneumatically sealed relation with said reaction chamber;

a solenoid magnet having a principal axis which is axially aligned with said pair of ablative electrodes, and surrounding opposing electrode tips of said pair of ablative electrodes while overlapping a space gap between said pair of ablative electrodes;

a first pulsed power supply system electrically connected to said solenoid magnet for creating a high magnetic field;

a second pulsed power supply system electrically connected to said pair of ablative electrodes for generating a high power pulsed electrical discharge arc between said pair of ablative electrodes and in the presence of said high magnetic field; and

a timing control system electrically connected to said first pulsed power supply system and to said second pulsed power supply system for controlling timing and order of occurrence of said high magnetic field and said high power pulsed electrical discharge arc.

20. (original) The system for synthesizing nanopowder of Claim 19 above, wherein said timing control system causes said high magnetic field and said high power pulsed electrical discharge arc to be initiated at a same time.

21. (original) The system for synthesizing nanopowders of Claim 19 above, wherein said timing control system causes said high power pulsed electrical discharge arc to be initiated a time delay after said high magnetic field is initiated.

22. (original) The system for synthesizing nanopowder of Claim 16 above, wherein said central insert is ablative, and is composed of one of a plastic and a polymer.

23. (original) The system for synthesizing nanopowders of Claim 19 above, wherein said gaseous atmosphere is comprised of one of a quenching gas and a reaction gas.

24. (original) The system for synthesizing nanopowders of Claim 19 above, wherein said gaseous atmosphere is comprised of a combination of a quenching gas and a reaction gas.

25. (original) The system for synthesizing nanopowders of Claim 19 above, wherein said solenoid magnet includes an insert for protecting an inner diameter surface of said solenoid magnet from plasma created by said high power pulsed electrical discharge arc.